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Midterm Paper

Qno 1

The following figures gives the number of children born to 50 woman

(i) Grouped frequency distribution

By scanning the data, we find that the largest number of ~~Baby~~ child born is '10' and the smallest number is "0" so that the range is

$$\begin{aligned}
 \text{Range} &= \text{Largest value} - \text{Smallest value} \\
 &= 10 - 0 \\
 &= 10
 \end{aligned}$$

Suppose we take "6" classes of equal sizes. So, width of equal class interval would be $= \frac{10}{6} = 1.66 \rightarrow \text{P} \textcircled{2}$

Frequency Distribution of No of children born

Class	Class Boundary	Tally	frequency
0-1	0.5-1.5		5
2-3	1.5-3.5		22
4-5	3.5-5.5		12
6-7	5.5-7.5		7
8-9	7.5-9.5		3
10-11	9.5-11.5		1
			<hr/> 50

(2)

(i) Ungrouped Frequency distribution:-

By scanning the data, we find that the number of children born is a discrete variable and the range is small so that the data can be conveniently sorted by taking the values of classes as 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 the Frequency distribution is then constructed as

Number of Children born	Tally	Frequency (F)
0		1
1		4
2	 	8
3	 	14
4	 	7
5	 	5
6		4
7		3
8		2
9		1
10		1
		<hr/> 50

(3)

Median for group data

$$\text{Median} = l + \frac{h}{f} \left(\frac{n}{2} - c \right)$$

l = lower class boundary

h = class interval

f = frequency

Putting values

$$\frac{n}{2} \text{th term} = \frac{50}{2} = 25$$

lower class boundary = 1.5

upper class boundary = 3.5

$$\text{Class boundary} = h = 3.5 - 1.5 = 2$$

$$f = 22$$

$$c = 5$$

Put the values

$$= 1.5 + \frac{2}{22} (25 - 5)$$

$$= 1.5 + \frac{2}{22} (20)$$

$$= 1.5 + \frac{20}{11}$$

$$= 1.5 + 1.82$$

$$\text{Median} = \boxed{3.32} \quad \text{Grouped data}$$

Median of Ungrouped data Arrange Data in Ascending Order

0 1 1 1 1 2 2 2 2 2 2 2 2 3 3 3
 3 3 3 3 3 3 3 3 3 3 3 4 4 4 4 4
 4 4 5 5 5 5 5 6 6 6 6 7 7 7 8 8
 9 10

$$\begin{aligned} \text{Median} &= \frac{n}{2} \\ &= \frac{50}{2} \\ &= 25^{\text{th}} \text{ Value} = \textcircled{3} \end{aligned}$$

Mode of ungrouped data:-
 Maximum number of ungrouped data is called mode
 Mode = 3 → Which is used 14 times

Mode of grouped data

Formula

$$\begin{aligned} &l + \frac{f_m - f_o}{2f_m - f_1 - f_o} \times h \\ &= \frac{1.5 + 22 - 5}{2(22) - 12 - 5} \times 2 \end{aligned}$$

$$1.5 + \frac{17}{27} \times 2$$

$$\text{Mode} = 2.76$$

Qno 2

The following is the distribution of wages per thousand employees in a certain factory.

Classes	2-4	6-8	10-12	14-16	18-20	22-24	26-28	30-32
f	3	13	6	10	5	3	5	3

34-36

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Calculate all Quartiles and Deciles?

Class	Class boundaries	frequency (f)	Cumulative Frequency (CF)
2-4	1-5	3	3
6-8	5-9	13	16
10-12	9-13	6	22
14-16	13-17	10	32
18-20	17-21	5	37
22-24	21-25	3	40
26-28	25-29	5	45
30-32	29-33	3	48
34-36	33-37	2	50
		$\Sigma = 50$	

Quartiles:-

$$Q_1 = \frac{n}{4} \Rightarrow \frac{50}{4} = 12.5$$

12.5 lies in 5-9 class boundary

So

$$Q_1 = l + \frac{h}{f} \left(\frac{n}{4} - c \right)$$

$$= 5 + \frac{4}{13} \left(\frac{50}{4} - 3 \right)$$

$$= 5 + .30 (12.5 - 3)$$

$$= 5 + .30 (9.5)$$

$$= 7.85$$

$$Q_2 = \frac{2n}{4} \Rightarrow \frac{2 \times 50}{4} = 25$$

25 lies in 13-17 class boundary

So

$$Q_2 = l + \frac{h}{f} \left(\frac{2n}{4} - c \right)$$

$$= 13 + \frac{4}{10} \left(\frac{2 \times 50}{4} - 22 \right)$$

$$= 13 + \frac{4}{10} (3)$$

$$= 13 + 1.2$$

$$Q_2 = 14.2$$

$$Q_3 = \frac{3n}{4} \Rightarrow \frac{3 \times 50}{4} \Rightarrow 37.5$$

37.5 lies in 21-25 class boundary

So

$$Q_3 = l + \frac{h}{f} \left(\frac{3n}{4} - c \right)$$

$$= 21 + \frac{4}{3} (37.5 - 37)$$

$$21 + \frac{4}{3} (0.5)$$

$$= 21 + 0.67$$

$$\text{Q}_3 = 21.67$$

Deciles

$$D_1 = \frac{n}{10} \Rightarrow \frac{50}{10} = 5$$

4 lies in 5-9 class boundary

Hence

$$D_1 = l + \frac{h}{f} \left(\frac{n}{10} - c \right)$$

$$= 5 + \frac{4}{13} \left(\frac{50}{10} - 3 \right)$$

$$= 5 + \frac{4}{13} (5 - 3)$$

$$= 5 + \frac{4}{13} (2)$$

$$= 5 + 0.61$$

$$D_1 = 5.61$$

$$D_2 = 5 + \frac{4}{13} \left(2 \times \frac{50}{10} - 3 \right)$$

$$D_2 = 5 + \frac{4}{13} (10 - 3)$$

$$D_2 = 5 + \frac{4}{13} (7)$$

$$D_2 = 5 + 2.15$$

$$D_2 = 7.15$$

$$D_3 = \frac{3n}{10}$$

$$\frac{3 \times 50}{10} = 15, 15 \text{ lies in } 5-9 \text{ Class Boundary}$$

$$\text{Hence } D_3 = l + \frac{h}{f} \left(\frac{3n}{10} - c \right)$$

$$D_3 = 5 + \frac{4}{13} \left(\frac{3 \times 50}{10} - 3 \right)$$

$$D_3 = 5 + \frac{4}{13} (15 - 3)$$

$$D_3 = 5 + 0.307 (12)$$

$$D_3 = 5 + 3.69$$

$$D_3 = 8.69$$

$$D_4 = \frac{4n}{10} = \frac{4 \times 50}{10} = 20$$

20 lies in 9-13 class boundary

$$\text{Hence } D_4 = l + \frac{h}{f} \left(\frac{4n}{10} - c \right)$$

$$D_4 = 9 + \frac{4}{6} (20 - 16)$$

$$D_4 = 9 + \frac{4}{6} (4)$$

$$D_4 = 9 + 2.67$$

$$D_4 = 11.67$$

$$D_5 = \frac{5n}{10} \Rightarrow \frac{5 \times 50}{10} = 25$$

25 lies in ~~13-17~~ 13-17 class boundary

$$\text{Hence } D_5 = l + \frac{h}{f} \left(\frac{5n}{10} - c \right)$$

$$D_5 = 13 + \frac{4}{10} \left(\frac{5 \times 50}{10} - 22 \right)$$

$$= 13 + \frac{4}{10} (25 - 22)$$

$$= 13 + \frac{4}{10} (3)$$

$$D_5 = 14.2$$

$$D_6 = \frac{6n}{10} \Rightarrow \frac{6 \times 50}{10} = 30$$

30 lies in 13-17 class boundary

Hence

$$D_6 = l + \frac{h}{f} \left(\frac{6n}{10} - c \right)$$

$$= 13 + \frac{4}{10} \left(\frac{6 \times 50}{10} - 22 \right)$$

$$= 13 + \frac{4}{10} (30 - 22)$$

$$= 13 + \frac{4}{10} (8)$$

$$= 13 + 3.2$$

$$D_6 = 16.2$$

$$D_7 = \frac{7n}{10} \Rightarrow \frac{7 \times 50}{10} = 35$$

35 lies in 17-21 class

Hence

$$D_7 = l + \frac{h}{f} \left(\frac{7n}{10} - c \right)$$

$$D_7 = 17 + \frac{4}{5} \left(\frac{7 \times 50}{10} - 32 \right)$$

$$D_7 = 17 + \frac{4}{5} (35 - 32)$$

$$= 17 + \frac{4}{5} (3)$$

$$= 17 + 2.4$$

$$= 19.4$$

$$D_8 = \frac{8n}{10} \Rightarrow 8 \times \frac{50}{10} = 40$$

40 lies in 21-25 C-B

Hence

$$D_8 = l + \frac{h}{f} \left(\frac{8n}{10} - C \right)$$

$$= 21 + \frac{4}{3} \left(\frac{8 \times 50}{10} - 37 \right)$$

$$= 21 + \frac{4}{3} (40 - 37)$$

$$= 21 + \frac{4}{3} (3)$$

$$= 21 + 4$$

$$D_8 = 25$$

$$D_9 = \frac{9n}{10} \Rightarrow \frac{9 \times 50}{10} = \frac{450}{10} = 45$$

45 lies in 25-29 Class boundary

Hence

~~Handwritten~~

(11)

$$Dq = l + \frac{h}{f} \left(\frac{qn}{10} - c \right)$$

$$Dq = 25 + \frac{4}{5} \left(\frac{9 \times 50}{10} - 40 \right)$$

$$Dq = 25 + \frac{4}{5} (45 - 40)$$

$$Dq = 25 + \frac{4}{5} (5)$$

$$Dq = 25 + 4$$

$$Dq = 29$$



Qno 3:-

Define the following.

- (a) Random Statistics
- (b) Inferential Statistics
- (c) Descriptive Statistics
- (d) Sources of Primary Data
- (e) Nominal Scale

Ans

(a) Random Statistics:-

Random Statistics is defined as a method of selecting a sample (random sample) from a statistical population in such a way that every possible sample that could be selected has a predetermined probability of being selected.

(b) Inferential Statistics:-

Inferential statistics is a branch of statistics through which we collect the data, analysis the data, summarize the data, interpretate the data and tabulate the data to get precise results in non-numerical form.

OR:- The process of reaching generalizations about the whole by examining a portion is called inferential Statistics

(c) Descriptive Statistics :-

The collection of data, analysis of data, summarization of data, interpretation of data, tabulation of data at last we get a precise result in numerical form is called descriptive Statistics

OR

Descriptive statistics is concerned with the summarization and describing a body of data, it is that branch of statistics which deals with concepts and methods concerned with summarization and description of important aspect of numerical data.

(d) Sources of Primary data:-

- Direct personal investigation
- Indirect investigation
- Interview method
- Collection through Enumerators
- Questioner Method
- Collection through local sources
- Computer interview method.

(e) Nominal Scale:-

It can be defined as "the classification of the observation into mutually exclusive qualitative classes is said to be nominal scale"

Eg:-

- ① Students are classified as male & female. We may use number 1 and 2
 - ② Rainfall may be classified as heavy, moderate and light. We may use number 1, 2 and 3
- The number when they are used only identify categories. In this scale no particular order is used.